

REMARKS

Claims 1 - 30 and 36 - 40 are still pending in this application and have been rejected by Examiner. This paper adds Claims 41 - 45.

1. The Office Action rejected Claims 1, 12 - 23, 26 - 30, 37, 38 and 40 under 35 U.S.C. § 103 as being unpatentable over the Hori patent (Hori '766), in view of the Hsieh *et al.* patent (Hsieh '035) and the Kang patent (Kang '357). Applicants respectfully traverse examiner's interpretation of the prior art as rendering the invention obvious over this patent. The Office Action notes that Hori '766 teaches how to form a FET with a silicon oxynitride gate dielectric. The Office Action also notes that Hsieh '035 and Kang '357 teach how to use metal silicates as high permittivity capacitor dielectrics that minimize leakage currents. The Office Action then alleges it would be obvious to combine Hori '766's method of forming improved-mobility FETs having an oxynitride film with Hsieh '035's capacitor dielectric—and that this combination would form applicants' invention.

First, the Office Action has not shown, and Applicants have not found, any teaching or suggestion in the prior art to combine these teachings. Nor does the Office Action show any teaching or suggestion in the prior art that Hori '766 was deficient in the aspect of having excessive leakage currents. Not only has the Office Action not shown any suggestion that this aspect of Hori '766 needed improvement, Applicants submit that ordinary artisans would not have sought ways to reduce leakage current in a gate dielectric. Applicants submit that it is a common motivation for ordinary artisans to reduce leakage currents in a storage capacitor—thus reducing the required refresh rate. However, Applicants submit that—although huge leakage currents would not be acceptable in a gate dielectric—ordinary artisans have not traditionally been motivated to reduce the leakage currents through most gate dielectrics—such as Hori '766's oxynitride film which reduces the important difficulty of mobility reduction.

Since there is no teaching or suggestion to combine these references, the Office Action must be relying on a compelling motivation.¹ However, Applicants do not agree that the Office

¹ “Before obviousness may be established, the examiner must show that there is either a suggestion in the art to produce the claimed invention or a compelling motivation based on

Action's recites a compelling motivation that is generally known to gate dielectric artisans of ordinary skill. The cited references do not teach the postulated motivation of reducing leakage current through gate dielectrics. If Examiner is relying on facts within the personal knowledge of the Examiner, Applicants request that Examiner provide an appropriate declaration.

Applicants also submit that even if an ordinary artisan found it obvious to try the postulated combination, there is no evidence cited that an ordinary artisan would believe that Hsieh '035's or Kang '357's capacitor dielectrics would be useful as superior gate dielectrics. Applicants submit that ordinary gate dielectric artisans understand that gate dielectric designs must take into account several properties (*e.g.*, interface state, electron mobility, band offsets) that are not usually a primary concern for memory capacitor designs. Thus, Applicants submit that the cited references do not indicate that an ordinary artisan would have a reasonable expectation that the Office Action's postulated combination would succeed.²

Thus, Applicants strongly submit that all of Applicants' claims are patentable over the cited art, because the references—taken together—would not have suggested the invention to those of ordinary skill in the art.

2. Claims 24 and 25 also contains additional limitations. These limitations include “the intermediate layer having a thickness less than 1 nanometer” and oxygen annealing this intermediate layer. As the Office Action noted, Hsieh '035's silicide layer is between 4 and 16 nm thick, before it is oxidized. In contrast, Applicants claim is limited to methods where intermediate layers thinner than 1 nm are oxygen annealed. Thus, the claimed range is more than a factor of four³ less than Hsieh '035's teachings. As such, Applicants submit that Claims 24 and 25 are patentable over the cited art, because the references—taken together—would not have suggested the invention to those of ordinary skill in the art.

sound scientific principles.” -- Ex parte Kranz, 19 U.S.P.Q. 2d 1216 (Bd. Pat. App. & Inter. 1990).

² “*Obviousness does not require absolute predictability, but a reasonable expectation of success is necessary.” -- In Re Clinton, 188 U.S.P.Q. 365 (CCPA, 1976).*

³ (and may be more than a factor of 16).

3. Applicants believe that the application is in condition for allowance. If Examiner has any further comments or suggestions, Applicants respectfully request that Examiner contact the undersigned in order to expeditiously resolve any outstanding issues.

Respectfully submitted,



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